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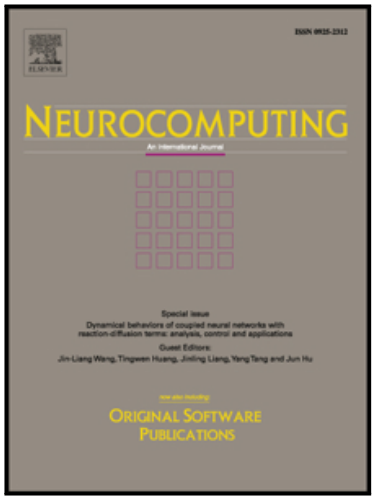

Deep convolutional networks with residual learning for accurate spectral-spatial denoising

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Deep convolutional networks with residual learning for accurate spectral-spatial denoising

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Abstract

Although hyperspectral image (HSI) denoising has been studied for decades, preserving spectral data efficiently remains an open problem. In this paper, we present a powerful and trainable spectral difference mapping method based on convolutional networks with residual learning in an end-to-end fashion for preserving spectral profile while removing noise in HSIs. Our approach, called SSDRN (spectral-spatial denoising by residual network), blends a spectral difference mapping strategy with a denoised key band for an efficient complete set of HSI denoising. The key band is selected based on a principal component transformation matrix. Experiments have been conducted on both ground based HSIs and airborne data. Comparative analyses validate that the proposed method presents superior denoising performance as it preserves spectral information better, and requires less computational time.

Keywords: Residual learning, hyperspectral image, denoising, spectral difference, band selection

1. Introduction

A hyperspectral image (HSI) describes the abundant spectrum reflected by every pixel in a scene with high spectral resolution [1]. Due to this property, HSI

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